

REMARKS

Claims 67-114 are pending in the application. In the Office Action at hand, those claims are rejected. The rejections are traversed.

In particular, Claims 67, 69, 70, 72-76, 79-82, 84-87, 89, 90, 92-96, 99-102 and 104-114 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Uehara (5,659,376) in view of Yamada (5,508,834). In addition, Claims 68, 71, 88 and 91 are rejected under § 103(a) as being unpatentable over Uehara and Yamada in view of Mizuno (US2002/0098344) and Hopper (4,388,375). Furthermore, Claims 77 and 97 are rejected under § 103(a) as being unpatentable over Uehara in view of Yamada and further in view of Sawa (JP06273760). Finally, Claims 78, 83, 98 and 103 are rejected under § 103(a) as being unpatentable over Uehara, Yamada and Sawa in view of Mori (6,288,700). In response to the § 103(a) rejections, the Applicants respectfully submit that Claims 67-114 are not obvious in view of Uehara, Yamada, Mizuno, Hopper, Sawa and Mori. Reconsideration is respectfully requested.

The present invention of Claim 67, as amended, recites a display system including a housing having an aperture, and a liquid crystal display panel having an image plane, and opposed transparent substrates defining first and second sides of the display panel. At least one substrate is mounted to and within the housing so as to position the display panel in optical alignment with the aperture. A first polarizer is disposed relative to the first side of the display panel. The first polarizer is mounted to be optically aligned with the aperture and mechanically spaced by the housing from the image plane by a distance such that visibility of first polarizer defects to a viewer is minimized.

The following arguments include some discussions that were previously presented, and also introduce new arguments for further addressing the Examiner's rejections. Referring to the embodiment of the present invention depicted in FIG. 2, the display panel 306 can be mounted and enclosed within the housing 304/308 in a manner where one or both of the transparent substrates of the display panel 306 are mounted to and within the housing 304/308, and in optical alignment with the aperture and the first polarizer 302.

On the other hand, typically in the prior art, the transparent substrates of the display panel are first mounted to an intermediate assembly or frame that is separate from the housing, and then the intermediate assembly or frame is mounted to the housing. The intermediate assembly or frame in the prior art is needed for properly aligning the display panel due to dimensional irregularities of the transparent substrates.

However, in the present invention, the Applicants have been able to obtain proper alignment without an intermediate assembly or frame, by mounting in a suitable manner, at least one transparent substrate of the display panel 306 to the housing 304/308. The elimination of an intermediate assembly or frame can reduce inventory, simplify the assembly process, and can result in cost savings.

Uehara is an example of such prior art having an intermediate assembly or frame. Uehara discloses in FIG. 2 an LCD apparatus having a liquid crystal panel 101 which is mounted to an intermediate fixing plate 112 by elastic resin 113. The intermediate fixing plate 112 is then mounted to a frame member 114 of the housing by elastic resin 115 for obtaining the proper positioning, alignment and securement of the liquid crystal panel 101 within the housing. As a result, neither of the glass substrates of the liquid crystal panel 101 in FIG. 2 are mounted to the housing. Instead, the intermediate fixing plate 112 is mounted to the housing.

FIGs. 12-16 of Uehara depict other embodiments in which an elastic sponge 161 appears sandwiched between the housing and the liquid crystal panel 101 for preventing dust intrusion and for vibration absorption. However, the elastic sponge 161 is mounted to the housing but not to the liquid crystal panel 101. The elastic member 321 in FIG. 23 is employed in a similar manner and is also not mounted to the liquid crystal panel. Therefore, the glass substrates of the liquid crystal panels in the embodiments of FIGs. 12-16 and 23 of Uehara are not mounted to the housing. Instead, the intermediate fixing plate is mounted to the housing for providing the alignment of the liquid crystal panel 101.

The text of Uehara discloses that the intermediate fixing plates are not part of the housing. For example, column 10 lines 3-40 of Uehara describes the fixing plate as part of a liquid crystal panel unit which is separate from the housing and becomes installed within the housing. This distinction that the intermediate fixing plate is not part of the housing is also reflected in the claims which recite them as separate components. For example, Claim 10 recites "said display panel is attached to a panel-supporting member, and the panel-supporting member is attached to the housing via a first elastic member" (where Claim 10 uses the term panel-supporting member to describe the intermediate fixing plate).

Yamada discloses in FIG. 7 a display having a liquid crystal cell 1 with transparent cover members 6 and 7 that are spaced from the liquid crystal cell 1. Polarizers 8 and 9 are mounted to the continuous exterior surfaces of transparent cover members 6 and 7 to be out of the depth of focus. The structure of the embodiment is similar to that shown in FIG. 5 where polarizers 8 and

9 are shown adhered to the exterior surfaces of cover members 6 and 7. As can be seen, the polarizers 8 and 9 are not mounted over apertures and the liquid crystal cell 1 is not mounted within a housing. The cover members 6 and 7 are merely attached to opposite surfaces of the liquid crystal cell 1 and cannot be considered a housing.

Accordingly, Claims 67, 69, 70, 72-76, 79-82, 84-87, 89, 90, 92-96, 99-102 and 104-114 are not obvious in view of Uehara and Yamada, since neither reference, alone or in combination, teaches or suggests "a liquid crystal display panel having an image plane, and opposed transparent substrates defining first and second sides of the display panel, at least one substrate being mounted to and within the housing so as to position the display panel in optical alignment with the aperture", as recited in base Claim 67 and similarly in independent or base Claims 84-87 and 104-106. The Examiner has incorrectly taken the position that at least one substrate of the liquid crystal panel 101 in FIG. 2 of Uehara is mounted to and within the housing. However, the Examiner has mistakenly considered the fixing plate 112 in FIG. 2 of Uehara as being part of the housing. As previously discussed above, the description and claims of Uehara both disclose that the fixing plates in Uehara are not part of the housing.

In addition, Uehara does not teach or suggest, "the first polarizer is mechanically spaced by the housing from the image plane in a manner where adhesion is not required" as recited in Claims 107-110 and similarly in method Claims 111-114. FIG. 2 of Uehara depicts the edges of protective plate 111 and the polarizer 118 as being spaced apart from the side walls of the recess in plate 125 so that there can be no mechanical gripping by the side walls of the recess. The Examiner incorrectly states in the Office Action at hand that "since the protective plate with the polarizer rests on the housing (125), it does not require any adhesives". Such an interpretation of FIG. 2 in Uehara is incorrect because it assumes that the display apparatus will always be in the horizontal orientation shown, so that the polarizer 118 and protective plate 111 can remain in position by virtue of gravity. However, it is known that devices containing liquid crystal displays must be able to withstand upright as well as inverted orientations. Uehara discloses such an alternate orientation on column 6, lines 33-34 which states "a large size panel is generally used in an upright position as in a desk top work processor . . .". FIG. 2 of Uehara, as shown, should not be positioned in such an upright orientation without using adhesives for securing the polarizer 118 or plate 111. In such an upright position and without adhesives, the polarizer 118 would likely fall out of position and would most certainly fall out if inverted. In contrast, referring to FIGs. 2-4 of this application which depict one embodiment of the present invention, the first

polarizer 302 can be mechanically spaced from the image plane of the display 306 with a first housing element 304. The first housing element 304 can mechanically secure or capture the first polarizer 302 within a receptacle 312. The receptacle 312 can be a recess within the first housing element 304, which surrounds an opening or aperture passing through the first housing element 304. This forms a recessed outer peripheral shoulder and rim (FIG. 4) for capturing the first polarizer 302 and mounting the polarizer over the aperture. Therefore, Claims 67, 69, 70, 72-76, 79-82, 84-87, 89, 90, 92-96, 99-102 and 104-114 are in condition for allowance.

Reconsideration is respectfully requested.

Mizuno discloses an optical adhesive film formed from polyester including foreign particles having a maximum size of about 20 μm or more. In addition, Hopper discloses that a polarizer can be formed of polyester.

Claims 68, 71, 88 and 91 are not obvious in view of Uehara, Yamada, Mizuno and Hopper since none of these references, either alone or in combination, teach or suggest “a liquid crystal display panel having an image plane, and opposed transparent substrates defining first and second sides of the display panel, at least one substrate being mounted to and within the housing so as to position the display panel in optical alignment with the aperture”, as recited in base Claim 67 and similarly in base Claim 87. Therefore, Claims 68, 71, 88 and 91 are in condition for allowance. Reconsideration is respectfully requested.

Sawa discloses a backlight having a light source 14, and light diffusing parts 11, 34 and 35, which are positioned in front of the light source 14.

Claims 77 and 97 are not obvious in view of Uehara, Yamada and Sawa since none of these references, either alone or in combination, teach or suggest “a liquid crystal display panel having an image plane, and opposed transparent substrates defining first and second sides of the display panel, at least one substrate being mounted to and within the housing so as to position the display panel in optical alignment with the aperture”, as recited in base Claim 67 and similarly in base Claim 87. Therefore, Claims 77 and 97 are in condition for allowance. Reconsideration is respectfully requested.

Mori discloses a light emitting flat panel device employed as a backlight which has laterally positioned LEDs 4R, 4G and 4B, for directing multicolor light into a series of lateral guide routes 2 in a board 1 for emission from a series of light emitting holes 7 in the light guide routes 2.

Claims 78, 83, 98 and 103 are not obvious in view of Uehara, Yamada, Sawa and Mori since none of these references, either alone or in combination, teach or suggest "a liquid crystal display panel having an image plane, and opposed transparent substrates defining first and second sides of the display panel, at least one substrate being mounted to and within the housing so as to position the display panel in optical alignment with the aperture", as recited in base Claim 67, and similarly in base Claim 87. Therefore, Claims 78, 83, 98 and 103 are in condition for allowance. Reconsideration is respectfully requested.

CONCLUSION

In view of the above remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned attorney.

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